

Health & Safety Manual

Supplement 21.16B

Safe Handling of Chemical Carcinogens in General Work Areas

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Approved by the ES&H Council

_____ date _____
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Safe Handling of Chemical Carcinogens in General Work Areas

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Safe Handling of Chemical Carcinogens in General Work Areas

1. Introduction

This supplement covers regulations and procedures that must be used when working with chemical carcinogens in general (nonlaboratory) workplaces. See Supplement 21.16A for policy on work with carcinogens in research laboratories.

Of over 450 materials identified by various organizations as chemical carcinogens, most do not have workplace safety regulations. Furthermore, the Occupational Safety and Health Administration (OSHA) standards for carcinogens used in research laboratories differ from those used in other workplaces (hereinafter referred to as nonlaboratories). These substances include materials with varying carcinogenic potency, some of which produce adverse effects more rapidly and easily than others. In addition, workplace exposure patterns and circumstances differ from exposures to substances intended to be drugs, food additives, or pesticides. Therefore, the relevance of animal tests and other data indicating a carcinogenic potential must be critically reviewed for their appropriateness for the occupational setting.

LLNL's requirements for carcinogen use are based on OSHA regulations and DOE orders,

specifically 5480.8A (Contractor Occupational Medical Program) and 5480.10 (Contractor Industrial Hygiene Program). Figure 1 shows an overview of the workplace requirements for carcinogens. See Appendix A for the terms and definitions used in this supplement.

1.1 Purpose and Scope

This supplement

- Summarizes various environmental, safety, and health requirements for work involving the use of chemicals that are human or human-suspect carcinogens in non-laboratories. Supplement 21.16A covers work with carcinogens in research laboratories.
- Establishes safety controls for the use of carcinogens based on the potency of materials and the conditions found in a particular operation. Each material and its usage shall be evaluated individually, and a hazard evaluation for each situation shall be completed to determine the appropriate handling procedures.

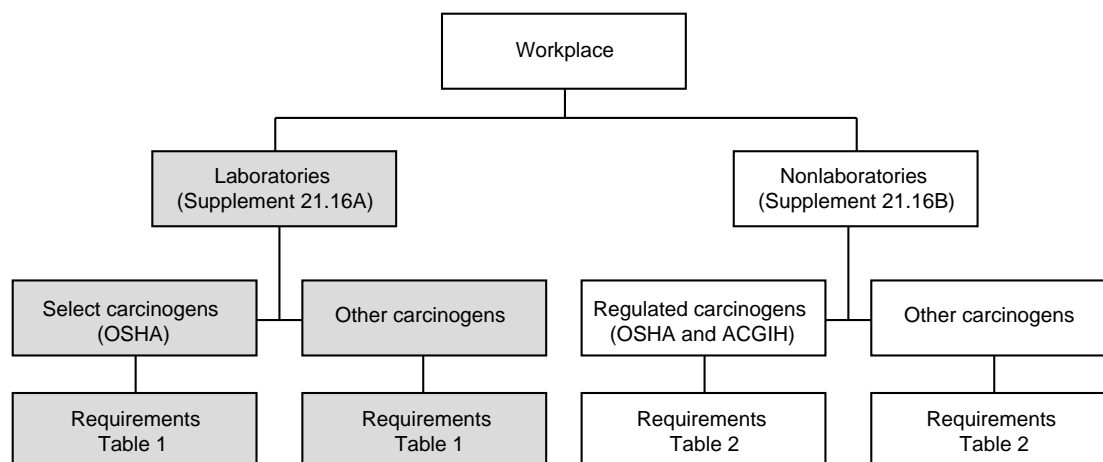


Figure 1. Workplace requirements for carcinogens (shaded boxes applicable to Supplement 21.16A only).

- Presents LLNL's approach to minimizing exposure to levels as low as reasonably achievable.
- Provides a framework for evaluating hazards and for selecting the appropriate control measures in cases where there are no mandatory requirements.

Although the evaluation and handling approaches covered in this supplement apply to the control of exposure to carcinogens, they can also be applied to other materials with high toxicity (e.g., mutagens or teratogens). For more details on minimizing exposure to these agents, consult with the industrial hygienist for your area environment, safety, and health (ES&H) team.

Requirements for beryllium and asbestos are covered in Supplements 21.10 and 21.19, respectively.

1.2 Applicability

The requirements in this supplement apply to all nonlaboratories where chemical carcinogens are used or stored. For policies on working with carcinogens in research laboratories, see Supplement 21.16A.

1.2.1 Laboratories

For the purpose of OSHA regulations, laboratories are places where

- Chemical manipulations are carried out on a laboratory scale.
- Multiple chemical procedures or chemicals are used.
- The procedures involved are neither part of a production process nor simulate one.
- Protective laboratory practices are commonly used, and equipment is available to minimize the potential for employee exposure to hazardous chemicals.

1.2.2 Nonlaboratories

"Nonlaboratories" are all other workplaces (e.g., craft, electrical, and mechanical shops; routine film processing, and pilot plants) that do not fit the description in the section entitled "Laboratories" above.

The requirements and procedures set forth in the section entitled "Use of Chemical Carcinogens in Nonlaboratory Areas" of this supplement

will enable nonlaboratory workplaces to comply with regulations for OSHA carcinogens (Table 1) and with DOE Order 5480.10 for its listed carcinogens. DOE requires strict controls for materials beyond those listed by OSHA. In nonlaboratory work areas, the term *regulated carcinogens* applies to materials that are specifically covered by either OSHA or DOE requirements. The term *other carcinogen* means that some cancer risks have been identified, but extensive regulations do not exist.

Table 1. OSHA carcinogens with expanded standards.

Chemical substance
2-Acetylaminofluorene
Acrylonitrile
4-Aminodiphenyl
Arsenic, inorganic
Asbestos ^a
Benzene
Benzidine
Bis(chloromethyl) ether
Cadmium
1,2-Dibromo-3-chloropropane
3,3'-Dichlorobenzidine (and its salts)
4-Dimethylaminoazobenzene
4,4'-Methylene dianiline
Ethyleneimine
Ethylene oxide
Formaldehyde
Methyl chloromethyl ether
1-Naphthylamine
2-Naphthylamine
4-Nitrobiphenyl
N-nitrosodimethylamine
2-Propiolactone
Vinyl chloride

^a Refer to Supplement 21.19 of this manual.

2. Use of Chemical Carcinogens in Nonlaboratory Areas

Chemical carcinogens shall be used at LLNL only when no other practical substitutes are available. When such chemicals are used, employee exposure shall be kept at levels as low as reasonably achievable. These substances can have other hazardous effects (e.g., flammability) besides causing cancer; therefore, it is important not to overlook other potential concerns when planning operations involving carcinogens. For assistance with comprehensive hazard evaluations, consult with your ES&H team or refer to the material safety data sheet (MSDS).

OSHA regulations and DOE orders governing the use of chemical carcinogens are more limiting for nonlaboratories (e.g., shops) than for laboratories. For example, there are stricter controls on

- Training.
- Access.
- Inventory tracking.
- Medical surveillance.
- Other aspects of use.

Carcinogens with OSHA-expanded standards (see Table 1) have more specific workplace requirements than those identified by the American Conference of Governmental Industrial Hygienists (ACGIH) as having occupational significance. For the purposes of this supplement and in accordance with DOE Order 5480.10, OSHA and ACGIH carcinogens are referred to as *regulated carcinogens* when used in nonlaboratories.

Beyond the controls mandated by standards, varying degrees of workplace controls and surveillance shall be applied to carcinogens based on the hazard of the substance and the intended operation. The following subsections describe the evaluation process for carcinogens and the various control measures that apply. Table 2 provides an overview of the requirements for using carcinogens in nonlaboratories.

2.1 Hazard Evaluation

2.1.1 Identification

To determine if a material is regulated because of its carcinogenic properties, refer to the "List of LLNL-Designated Carcinogens" developed by the Industrial Hygiene Group (ext. 2-1214) of Hazards Control. The list is published separately from this supplement to simplify distribution. For help with identifying chemicals that are not on this list, contact

the LLNL main and branch libraries or the industrial hygienist for your area ES&H team.

For the purposes of regulatory compliance in nonlaboratory workplaces, the two categories of carcinogens that have been identified are *regulated carcinogens*, which have more restrictive requirements, and *other carcinogens* (see Appendix A, Terms and Definitions).

The relative hazard of exposure to a chemical carcinogen depends not only on the type of carcinogen and its innate carcinogenic potency but also on its physical and chemical properties, potential route(s) of exposure, duration of exposure, quantities handled, and the specific process involved. Therefore, users, with assistance from the area industrial hygienist, shall examine these factors to classify carcinogen operations into the appropriate safety control levels with varying degrees of requirements. See Appendix B for the different safety control levels.

2.1.2 Risk Assessment

Once the proposed use of a carcinogen has been identified, a risk assessment of the overall operation shall be performed to determine the appropriate safety requirements. Although some rules and controls are mandatory for carcinogens, the degree to which they are applied is based on assessing the risk and establishing safety levels. Each safety level has specific controls to ensure personnel protection and to prevent environmental contamination. See Appendix B of this supplement for a summary of the requirements for each level.

If an airborne carcinogen exceeds the prescribed OSHA or DOE action level (see Appendix A, Terms and Definitions), certain procedures and surveillance must be implemented to reduce exposure. The ES&H team industrial hygienist shall provide guidance on a case-by-case basis for affected operations.

When appropriate, the area industrial hygienist and the environmental analyst shall use the hazard review form (see Appendix C) or its equivalent (e.g., C&MS Project Work Plan) to evaluate the use and storage of *regulated carcinogens*. Each operation (rather than each material) shall be evaluated and assigned controls as needed. Use of this form may determine the need for an operational safety procedure (OSP). For most cases, the initial review will be sufficient. However, if the process is too complex to be covered by a hazard review form, an OSP may be required.

Table 2. Requirements for carcinogens in nonlaboratories.

Requirement	Section	Regulated carcinogens ^a	Other carcinogens ^b
Hazard evaluation	2.1	√	+
Written safety procedure	2.2.1	√	+
Purchasing/receiving	2.2.2	+	N/A
Establishing regulated areas	2.2.3	+ ^c	N/A
Inventory	2.2.4	√	√
Labeling, packaging, and storing	2.2.5	√	√
Containment	2.2.6	√	√
Work practices	2.2.7	√	√
Monitoring	2.2.8	+	+
Waste disposal	2.2.9	√	√
Decontamination	2.2.10	√	√
Emergency plan	2.2.11	√	√
Employee training	2.3	√	√
Medical surveillance	2.4	+	N/A

^a Applies to OSHA- and ACGIH-listed carcinogens (i.e., those that are regulated by DOE orders).

^b Applies to those compounds that are not *regulated carcinogens* but have been classified as carcinogens by other organizations.

^c Establishment will depend on potential level of exposure.

√ = required in all cases.

+

N/A = not applicable.

Formal, written hazard reviews are recommended but not required for *other carcinogens*.

2.2 Controls

2.2.1 Written Safety Procedures

A safety procedure must be written for *regulated carcinogens* and for establishing controls and work practices for each process of a “regulated” area (see the section entitled “Establishing Regulated Areas”); a hazard review form shall supplement the procedure. An MSDS shall be included with the review for each carcinogen. If the FSP does not specify general carcinogen controls, an OSP and a hazard review shall be prepared. Additional information required for an OSP includes

- Special controls that are not included in the controlling FSP.
- Monitoring procedures, where appropriate, for evidence of personnel exposure and/or environmental contamination.

- Methods for
 - Decontaminating equipment and work surfaces.
 - Handling carcinogenic wastes generated.
- Emergency procedures in the event of accidental spill and/or personnel exposure.

2.2.2 Purchasing/Receiving

When preparing a purchase requisition (Form LL-2350-2), check “toxic material” and add “carcinogen” in the key word section. When several items are being ordered, identify carcinogens as such, and order only the amount needed for the project. The Procurement Department will contact the Industrial Hygiene Group for approval of all purchase requisitions for carcinogens. NOTE: Unless approved by the area industrial hygienist, *regulated carcinogens* shall not be ordered through blanket purchase orders that bypass the LLNL purchasing system.

The Materials Management Section shall release carcinogenic materials from Central Supply stock only upon receiving an approved hazard review form or OSP. Some carcinogenic materials available from Central Supply include benzene, chloroform, carbon tetrachloride, and formaldehyde.

Carcinogens shall be carefully handled and transferred on site to avoid accidental release or personnel exposure. Additional handling requirements that may be necessary for certain potent carcinogens include initial delivery to the Materials Management Section, inspection by a health and safety technician in a controlled environment, and storage in double containers in locked cabinets. For more detailed information, contact your area industrial hygienist.

2.2.3 Establishing Regulated Areas

A "regulated" area shall be established wherever (1) the OSHA standard for the regulated substance requires one, or (2) the use of an ACGIH Category 1 or 2 carcinogen creates a significant potential for occupational exposure. Significant potential exposure is interpreted to mean that workplace levels could exceed established action levels or one-half the prescribed exposure limit. The industrial hygiene staff shall determine the controls necessary to maintain exposure below these limits. The characteristics of the regulated area shall be appropriate to ensure that access is controlled. Such controls depend on the quantity and physical properties of the material being used and on the operations being performed. At minimum, the following controls are required for each regulated area:

- Warning signs, including the LLNL health hazard communication poster (see Appendix D, Fig. D-1), shall be posted at all entrances of regulated work areas where chemical carcinogens are used. Procedures that employees must follow upon entering or leaving such areas shall be posted at entrance and exit points.
- Access shall be restricted to authorized employees.
- A record shall be maintained of all employees working in the regulated area.
- Employees shall wash their hands, forearms, face, and neck when they exit a regulated area, when they are close to the exit point, and before they engage in other activities.
- Engineering controls shall be the primary method used to minimize exposure to

carcinogens and to prevent the release of hazardous levels of carcinogens into the workroom, adjacent work areas, or the outside environment.

- Equipment, materials, or other items shall be carried in and out of a regulated area in a manner that shall prevent contamination to nonregulated areas or the outside environment.
- Dry sweeping or mopping is prohibited.
- Emergency and decontamination procedures shall be written (as described in this supplement).
- Storage, use, or consumption of food, beverages, tobacco products, and cosmetics is prohibited.

Additional rules apply to the list of OSHA *regulated carcinogens*; consult with your area industrial hygienist for those requirements.

2.2.4 Inventory

The chemical names of all carcinogens in an area (as well as all chemicals), including those in storage, shall be listed on the health hazard inventory form (LL-5592) and forwarded to the MSDS coordinator (L-384). Employees on all shifts shall have access to the MSDS for each chemical in the work area. This inventory shall be updated annually or when new carcinogens are added to the area.

2.2.5 Labeling, Packaging, and Storing

Danger labels (see examples in Appendix D) shall be placed on all primary and secondary (outer) containers of carcinogens, whenever feasible, and shall identify other hazards of the material or product (e.g., corrosiveness). Containers with carcinogens covered by an OSHA-expanded standard (Table 1) shall be labeled in accordance with the requirements of that standard.

Carcinogens shall be packaged to withstand shocks, pressure changes, and any other conditions that may cause leakage of contents. These chemicals shall also be stored in designated areas, cabinets, or refrigerators within the primary work or storage area; and precautions shall be taken to protect them from rodents, weather, incompatible chemicals, and spillage. Additional storage requirements (e.g., use of double containers) may be necessary for certain highly potent carcinogens with physical properties that enhance spontaneous release and exposure (e.g., highly dispersible powders or volatile solids). For more detailed information on packaging and storing these chemicals, consult with the area industrial hygienist.

For additional guidance on the proper methods for packaging and shipping carcinogenic materials, contact the Materials Management Section or refer to U.S. Department of Transportation regulations (49 CFR Parts 170–178).

2.2.6 Containment

The controls in this section are most reliable for protecting employees and the environment, and shall be applied to the fullest extent as the primary means of controlling exposure. Containment devices shall include a combination of the facility features and engineering controls below.

- Negative pressure of the workplace relative to common areas (e.g., corridors).
- Filters and traps on air, vacuum, and ventilation piping when technically appropriate.
- Chemical fume hoods, glove boxes, closed systems, and other isolation devices.
- Nonpermeable work surfaces.
- Secondary containment trays.

The degree to which these controls shall be applied depends on the desired safety level of the operation. For example,

- Use of solid materials may not require a ventilated enclosure, but use of a gas may require a glove box.
- Operations involving volatile chemicals or those that generate aerosols shall be conducted in a ventilated enclosure or with an engineered close-capture exhaust system.
- Vertical laminar-flow hoods (e.g., down-draft benches) shall be evaluated and approved by the area industrial hygienist before they are used for carcinogen operations. These devices are rarely suitable because they recirculate or release exhaust air into the workplace.
- Analytical instruments that produce vapors or aerosols shall be connected to a mechanical exhaust system when used with carcinogens. “Ductless” hoods shall not be used for carcinogens.
- The exhaust discharge shall be located to prevent reentrainment into the building.
- Containment devices for carcinogens shall be designed to permit maintenance and decontamination activities with minimal exposure to carcinogens.

2.2.7 Protective Equipment and Work Practices

Protective Equipment. Protective clothing shall be worn to safeguard regular clothing and the skin from contact with carcinogens. At minimum,

such clothing shall include a fully fastened lab or shop coat, safety glasses, and closed-toe shoes; lab or shop coats shall only be worn within the confines of the work area. Additional clothing (e.g., disposable jumpsuits with head covers, face shields, respirators, shoe covers, and gloves) may be required for more stringent operations. **NOTE:** When selecting gloves, the carcinogen as well as the diluent, solvent, or other materials in use shall be considered because multiple layers may be necessary to prevent skin contact through permeation. Consult with the Industrial Hygiene Group for guidance on glove selection if necessary.

Contaminated clothing shall be removed and disposed of immediately.

Work Practices. Workers shall

- Not mouth pipette; use mechanical devices only.
- Wash hands immediately upon completing a procedure where a chemical carcinogen has been used and when leaving the workplaces. Immediately after skin contact or emergency exposure to a carcinogen, wash or, if appropriate, shower the affected area.
- Contact the Health Services Department (ext. 2-7459) for advice or medical evaluation, or both, after an exposure or potential exposure.
- Use hypodermic needles only if no other feasible substitution is available. Do not attempt to recap or cut used needles; place the entire needle and syringe in an appropriate sharps container for disposal as hazardous waste.
- Perform housekeeping, maintenance, and janitorial procedures (e.g., use wet cleaning and high-efficiency particulate air-filtered [HEPA] vacuums) to prevent aerosols from forming or contamination from spreading. Do not dry sweep carcinogen work areas. (Special clean-up procedures for spilled carcinogens shall be developed as part of the emergency plan.)
- Not eat, drink, smoke, chew gum or tobacco, apply cosmetics, or store utensils, food, or food containers in areas where chemical carcinogens are used or stored.

2.2.8 Monitoring

The hazard review may indicate the need for a workplace to be monitored for chemical exposure. Principal investigators are then responsible for

contacting the area ES&H team to arrange for monitoring. This may focus on

- Personnel—to determine potential exposure or the need for medical consultation and/or surveillance.
- General area or process—to determine the effectiveness of engineering controls.
- Surfaces—to evaluate contamination control and the effectiveness of decontamination practices.
- Equipment and other supplies—before they are removed from the work area—to prevent the spread of carcinogens.

Carcinogens governed by OSHA-expanded standards (Table 1) shall be evaluated by the Industrial Hygiene Group to determine what personnel and workplace monitoring program is needed. If exposure levels for a substance routinely exceed the action level, monitoring shall continue periodically. An Ames bioassay test may be conducted to determine the extent of surface contamination and to verify if the work area is safe for normal use. Termination of any of the monitoring routines previously mentioned shall be determined based on the exposure levels found.

If monitoring indicates an overexposure to a substance, the employee, supervisor, and Health Services Department shall be notified; subcontractor employees shall be notified through the subcontracting company and the LLNL contract monitor.

2.2.9 Waste Disposal

Before beginning an activity that involves a chemical carcinogen, plans shall be developed for the handling and disposal of contaminated wastes and surplus carcinogens. Users shall properly segregate, package, and label all solid and liquid wastes contaminated with carcinogens and shall arrange for disposal with the area hazardous waste management technician. A copy of the hazard review form or the MSDS shall accompany the waste being removed for disposal. Waste mixtures containing more than 0.1% of an OSHA select carcinogen shall be labeled as carcinogenic waste.

2.2.10 Decontamination

Recommended procedures for sanitizing equipment and surfaces contaminated with carcinogens shall be listed on the hazard review form and in the OSP or FSP. A decontamination process shall be carefully selected to ensure that all toxic or carcinogenic materials are destroyed or removed from the work surface.

2.2.11 Emergency Plan

Before beginning an activity that involves a chemical carcinogen, plans for emergency response to spills, exposures, or accidents shall be developed and included in the OSP or FSP and on the hazard review form. General guidance for emergency planning shall include developing procedures for

- Evacuating the area and contacting the Fire Department.
- Restricting access to the area.
- Providing care to injured or exposed personnel.
- Showering or washing and obtaining medical attention immediately. A personal decontamination facility is available at the Health Services Department.
- Eliminating hazards that may still exist.
- Decontaminating the area.

Specific emergency procedures shall be developed and posted in regulated areas, and employees shall be familiar with these procedures and their applications. Occurrences that could result in personnel exposure or release to the environment shall be investigated and, if appropriate, reported to DOE.

2.3 Employee Training

Employees with potential for exposure to carcinogens shall receive sufficient information and training so that they can follow safe work practices and understand the relative significance of the potential hazards they may encounter. Supplements 7.02 (formerly Supplement 1.02) and 21.01 of the LLNL *Health & Safety Manual* provide further details on employee education and training requirements.

2.3.1 Regulated carcinogens

Before employees are authorized to enter a regulated area, they shall receive training in the following:

- Nature of the carcinogenic hazard, including local and systemic toxicity.
- Specific nature of the operation that could result in exposure.
- Purpose for and application of
 - The medical surveillance program, as appropriate.
 - Decontamination practices and procedures.
 - Specific first-aid procedures and practices.
- Purpose for and significance of emergency practices.
- Employee's specific role in emergency procedures.

- Specific information to help them recognize and evaluate conditions and situations that may cause the release of a carcinogen while in use.
- Initial and annual review of requirements for carcinogen control.

2.3.2 Other carcinogens

Employees shall receive training in the following areas before beginning work with a chemical carcinogen:

- Methods (e.g., using monitoring devices) and observations (e.g., visual appearance) that may be used to detect the presence or release of a carcinogen.
- Physical and health hazards of the carcinogen.
- Measures to protect them from hazards, including specific procedures implemented to control exposure (e.g., using appropriate work practices, containment devices, personal protective equipment, and emergency procedures).
- Proper labeling, storage, and disposal practices.
- Relevant FSPs, OSPs, and hazard reviews.
- Job responsibilities.

This training can be accomplished through formal prepared courses and/or informal on-the-job training. A qualified instructor (e.g., a supervisor or a member of the area ES&H team) shall provide and document such training in accordance with the *LLNL Training Program Manual*. Some of the training topics above may be on the MSDS and

the hazard review form for special chemicals; these forms shall be made available to employees who use such substances.

2.3.3 Ancillary workers

Workers (e.g., maintenance and custodial staff) shall receive orientation and training as appropriate for their duties and potential exposure. For regulated areas, this training shall cover access and entrance controls, potential hazards from their operations in the area, and emergency procedures. If ancillary workers will have standing authorization to enter the regulated area, they shall receive the complete annual training program in the section entitled "Regulated Carcinogens." For work areas that are not regulated and where carcinogens are used, ancillary workers shall receive the appropriate training as specified in the health hazard communication program in Supplement 7.02 of the *LLNL Health & Safety Manual*.

2.4 Medical Surveillance

The Industrial Hygiene Group or management of employees with exposure to carcinogens that exceed OSHA or DOE action levels shall inform the Health Services Department. (The ES&H team industrial hygienist monitors action levels and advises management which employees might be exposed.) Medical surveillance will be provided as defined by specific OSHA requirements. For workers who may have health concerns regarding their work, periodic physical examinations and consultations are available upon request.

3. Responsibilities

General responsibilities for all staff levels are described in Chapter 1 of the *LLNL Health & Safety Manual*. This section covers the job responsibilities for individuals who use chemical carcinogens in LLNL work areas.

3.1 Facility Manager

The facility manager shall

- Know whether carcinogens are used, produced, stored, or handled in any way in the facility.
- Be familiar with this supplement and its content and objectives.
- Review completed hazard review forms.

3.2 Program Manager/Division Leader

The primary responsibilities of the program manager or division leader are to

- Identify and develop safety procedures, including OSPs, for each task involving carcinogens.
- Be familiar with this supplement and its applicability to his/her operations.
- Approve hazard review forms.
- Ensure that employees have applicable information and training before they are assigned to work with carcinogens.

- Determine which workers are required to participate in medical surveillance, and provide a list of these employees to the Health Services Department (L-723) before job assignment.

The program manager or the division leader may delegate these responsibilities to the project leader, principal investigator, and/or group leader.

3.3 Work Area Responsible Person

The person responsible for work areas in which carcinogens are used or stored shall

- Review
 - Planned activities and hazardous chemicals being used.
 - Emergency, waste disposal, and decontamination plans.
 - Special personal protective equipment that may be required.
- Ensure that
 - Employees in work areas know and follow the requirements for the carcinogen used, including the contents of FSPs, OSPs, and hazard review forms.
 - Proper engineering and administrative controls are established and performed as intended.
 - Personal protective equipment is available and functional.
 - Assigned staff members have been trained in the hazards of the operation and that they adhere to appropriate protective measures.
- Identify carcinogens on purchase requisitions.
- Inventory all carcinogens in the work area and send the inventory form to the Industrial Hygiene Group (L-384).
- Initiate evaluations of operations on hazard review forms for approval by the Industrial Hygiene Group, the Environmental Protection Department, and the program manager/division leader.
- Initiate an OSP when required.

3.4 Employee

The employee shall

- Conduct each task in accordance with applicable FSPs, OSPs, and/or hazard review forms.
- Follow facility and institutional procedures.
- Attend required training.

- Participate in medical surveillance when required.
- Use protective equipment and devices as required.

3.5 Health Services Department

The Health Services Department shall

- Provide
 - Medical surveillance for carcinogen workers in accordance with OSHA and DOE specifications.
 - Decontamination support and medical consultation to workers involved in significant accidental exposures.
 - Periodic physical examinations and consultations for concerned employees upon request.
- Maintain records for carcinogen workers, including copies of medical examination results and accident reports.

3.6 Industrial Hygiene

Industrial hygienists assigned to ES&H teams shall

- Assist with identifying
 - Carcinogens and their categories (e.g., OSHA *regulated* or *other*).
 - Carcinogen workers.
- Approve hazard review forms for operations involving carcinogens.
- Determine the need for and frequency of workplace monitoring, and inform supervisors and employees of the results. The Health Services Department shall also be informed of measured or suspected overexposures.
- Provide specific training to programs or divisions, as requested.

3.7 Materials Management Section

The Materials Management Section shall

- Authorize the release of carcinogens in Stores only when an approved OSP or a hazard review form accompanies the request.
- Receive carcinogen shipments and inspect packages for visible container damage and proper labeling.
- Provide guidance on the proper methods for packaging and shipping carcinogens off site.

3.8 Procurement Department

The Procurement Department shall send carcinogen purchase requisitions to the Industrial Hygiene Group of Hazards Control (L-384) for prior approval.

3.9 Supply and Distribution Department

The Supply and Distribution Department will release chemical carcinogens ordered from Central Supply only when the order has been approved by the Industrial Hygiene Group or the Materials Management Section.

3.10 Environmental Protection Department

In addition to approving hazard review forms for operations involving carcinogens, the

environmental analyst assigned to ES&H teams shall provide

- Guidance to carcinogen handlers on (1) how to implement environmental controls and procedures; and (2) the proper management of hazardous waste contaminated with carcinogens to ensure compliance with applicable federal, state, local, and environmental requirements.
- Specific training to programs and divisions as required.

The hazardous waste management technician assigned to the ES&H team shall

- Provide specific guidance to carcinogen handlers on how to properly segregate, package, and label solid and liquid waste contaminated with carcinogens based on Hazardous Waste Management waste acceptance criteria.
- Coordinate disposal of waste generated in the area.

4. References

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DOE Order 5480.8A, "Contractor Occupational Medical Program," June 26, 1992.

DOE Order 5480.10, "Contractor Industrial Hygiene Program," June 26, 1985.

29 CFR 1910.1450, "Occupational exposure to hazardous chemicals in laboratories."

Environmental Protection Department, "Draft Guidelines for Design and Operation of Retention Tank Systems," February 1992 (UCRL-AR-103976).

Appendix A

Terms and Definitions

Action level	An airborne concentration of a hazardous material that triggers implementation of health and safety controls such as workplace surveillance, monitoring, training, and medical examinations. This action level is often set at 50% of the OSHA permissible exposure limit.
Animal carcinogen	A material that shows sufficient evidence of causing cancer in animals; however, insufficient data are available to show a causal relationship to human cancer.
Carcinogen	Any substance that causes the development of cancerous growth in living tissue.
Close-capture system	A type of high-velocity exhaust ventilation system in which hazards or contaminants are controlled at their point of origin using ducts, funnels, cones, and flanges. The system may partially enclose the source of generation.
Designated area	An OSHA term for an area that may be used for working with <i>select carcinogens</i> , reproductive toxins, or substances that are quickly and highly toxic. Such area may be an entire laboratory, an area in a laboratory, or a device such as a hood or glove box. The term applies only to a "laboratory" (see definition below); for other workplaces, see "regulated area." (From 29 CFR 1910.1450.)
Human carcinogen	A material for which sufficient evidence of carcinogenicity from studies of humans indicates a causal relationship between the agent and human cancer.
Human-suspect carcinogen	A material with limited evidence of carcinogenicity in humans and generally substantiated evidence as an animal carcinogen.
Laboratory	A facility where relatively small quantities of hazardous chemicals are used on a nonproduction basis, operations are designed to be easily and safely performed by one person, multiple chemical procedures are done, and protective practices and equipment are available and in common practice. (From 29 CFR 1910.1450.)
Mutagen	A material that can alter genetic information within cells.
Medical surveillance	A regulatory or institutionally prescribed examination protocol for specified occupational hazards.
OSHA-expanded standards	A regulation that specifies detailed requirements for workplace controls, employee training, and medical examination.
Other carcinogen	A carcinogenic material that does not meet the definitions of <i>select</i> or <i>regulated carcinogen</i> .

Permissible exposure limit (PEL)	The OSHA permissible exposure limit for an airborne concentration of a hazardous chemical in the workplace. PELs are listed in 29 CFR 1910, Subpart Z.
Regulated area	An OSHA term for a workplace with specified engineering and work-practice controls and where entry and exit are restricted and controlled.
Regulated carcinogen	For the purpose of this policy: in nonlaboratory workplaces, a material that is specifically regulated by an OSHA standard or DOE order. Usage restrictions and controls are more stringent for these carcinogens than for others. See also <i>select carcinogen</i> and <i>other carcinogen</i> .
Select carcinogen	An OSHA term for a substance that is used in a laboratory and meets one of the following criteria: <ul style="list-style-type: none"> • Regulated by OSHA as a carcinogen. • Listed under the category “known to be carcinogens” in the <i>Annual Report on Carcinogens</i> by the National Toxicology Program (NTP). • Listed in Group 1 (carcinogenic to humans) in the International Agency for Research on Cancer (IARC) <i>Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man</i>. • Listed in either Group 2A or B by IARC or is under the category “reasonably anticipated to be carcinogens” by the NTP and causes statistically significant tumor incidence in experimental animals according to the following criteria: <ul style="list-style-type: none"> — After inhalation exposure of 6 to 7 hours per day, 5 days per week for a significant portion of a lifetime, to dosages of less than 10 mg/m³. — After repeated skin application of less than 300 mg/kg of body weight per week. — After oral dosages of less than 50 mg/kg of body weight per day. (From 29 CFR 1910.1450.)
Teratogen	A material that can cause fetal abnormalities.
Threshold limit values (TLVs)	Time-weighted average concentrations of materials for a normal eight-hour workday to which nearly all workers may be repeatedly exposed without adverse effect. These values are developed and published by the ACGIH.
Tumor dose ₅₀ (TD ₅₀)	The amount of a substance that will result in tumor formation in 50% of a test population of exposed experimental animals.

References

- National Toxicology Program, *Annual Report on Carcinogens*, U.S. Department of Health and Human Services, Research Triangle Park, N.C. (latest edition).
- International Agency for Research on Cancer, *Monographs on the Evaluation of Carcinogenic Risk of Chemicals to Man*, World Health Organization, Lyon, France (latest edition).

Appendix B

Safety Control Level Assignment

The hazard review form shall indicate the safety control level for the particular operation being assessed. These levels consist of groups of controls that provide increasing degrees of protection to reduce exposure to and release of hazardous agents. The general elements of a safety control level shall be considered as an initial planning guide when establishing a workplace for carcinogens; fewer or additional controls may be warranted based on the operational analysis performed by the experimenter or supervisor, the area team industrial hygienist, and the environmental analyst. An overall safety control level shall indicate the extent of risk and degree of control needed to reduce exposure. The criteria and methods used to evaluate carcinogen operations are described below.

B.1 Relative Hazard Factors

The relative hazard of an operation is determined by evaluating the carcinogen, its potency and physical characteristics, and the route of and potential for exposure (including duration).

B.2 Calculating an Overall Hazard Score

The formula below gives an overall score of the potential hazard used to assign a safety control level. Points are assigned to each factor using the data in Tables B-1 through B-6, which are at the end of this appendix.

Hazard Score = $T \times P \times C \times R \times E$, where

T = Type.

P = Potency.

C = Physical characteristics.

R = Route of exposure.

E = Exposure potential.

B.3 Safety Control Level Needs

Safety control level needs for each operation involving carcinogens are based on the score obtained in the section entitled "Calculating an Overall Hazard Score." See the section entitled "Safety Control Level Features" below for the recommended safety control level for each operation. *Note that these factors and calculations are not intended to be precise; use professional judgment where necessary.* OSHA-regulated carcinogens may require additional safety features for compliance.

B.4 Safety Control Level Features

Each operation, rather than each substance, shall be evaluated and assigned controls as needed. Following are the controls for each level (see also Table B-7 at the end of this appendix). For laser dyes, see Chapter 28, Appendices A and B, of the LLNL *Health & Safety Manual*.

B.4.1 Low Safety Control Level

The low safety control level is appropriate for work involving chemicals that have a low-hazard potential and for work that does not require special engineering design features or containment equipment. Public

access is allowed for areas designated as a low safety control level. The requirements for this level, which are generally those of good work practice, are described below.

Access

- Close doors when operations are in progress.
- Allow only animals related to the experiment in the facility.
- Advise maintenance and emergency personnel of the potential hazards and proper precautions.

Facilities

- Provide
 - Hand wash, eye wash, and safety shower facilities.
 - Workers with access to a change room and shower facility.
 - Minimum general ventilation of 15 cfm per person.
 - Pest control program.
- Design surfaces for easy cleanup and decontamination.

Work Practices

- May do most work on an open bench.
- Maintain cleanliness of work surfaces; clean up after each task and spill.
- Do not mouth pipette; use mechanical devices only.
- Do not eat, drink, smoke, chew gum or tobacco, store food, or apply cosmetics in the work or storage areas.
- Use
 - Eye protection.
 - Protective clothing and other personal protective equipment (as needed), including appropriate gloves and respirators.
 - Hypodermic needles only if no other feasible substitution is available. Do not recap or cut used needles; dispose of the entire needle and syringe in an appropriate sharps container.
 - Only the amount of material needed to complete the project.
 - Carcinogen warning labels on all containers.
- Post appropriate warning signs at entrances while carcinogen operations are in progress.
- Keep only a minimum amount of the material for use and in storage. Consolidate and control storage areas.
- Follow proper waste-handling and disposal procedures for chemicals and contaminated clothing. Do not send contaminated clothing through the laundry service.
- Wash hands after each task and before leaving the work area.
- Dispose of *all* excess chemicals and unusable equipment properly when the project is completed.
- Sanitize contaminated areas with the appropriate agents.
- Maintain and periodically inspect liquid-waste retention systems in accordance with guidelines for the Environmental Protection Department (see reference in Section 4).
- Obtain proper janitorial and maintenance practices and procedures.

B.4.2 Medium Safety Control Level

The medium safety control level is appropriate for work with chemicals that have a moderate-hazard potential and require some engineering design features. Note that chemical fume hoods or ventilated enclosures are required for containing operations that produce significant amounts of airborne gas, vapor, or particulates. It is not necessary to isolate the workroom from the general traffic pattern of the building for work at this level; however, public access is not permitted while operations are in progress.

All of the requirements for the low safety control level apply to this level, including the following:

Facilities

- Maintain proper ventilation systems such that the pressure in workrooms is always negative relative to access corridors.
- Do not recirculate exhaust air from primary containment equipment.
- Protect house vacuum lines with appropriate filters and liquid traps.

Work Practices—Do not work on an open bench; conduct all work within chemical fume hoods or with other equivalent containment equipment.

B.4.3 High Safety Control Level

The high safety control level is appropriate for work with chemicals that have a high-hazard potential and require special engineering design features and containment equipment. All of the requirements for the low and medium safety control levels apply to this level, including the following:

Access

- Prohibit public access.
- Control employee access.
- Close doors at all times.
- Isolate work area from the general traffic pattern of the building.
- Maintain a written record of all persons entering and using the area.

Facilities

- Ensure that all walls, floors, and ceilings are sealed.
- Filter or clean exhaust air before it is released into the environment.

Work Practices

- Conduct all work in glove boxes or comparable isolated containment.
- Store carcinogens in primary or secondary containers to avoid personnel exposure in case of accidental container breakage.
- Use protective clothing while handling carcinogens. At minimum, protective clothing shall consist of a fully fastened disposable lab coat or coveralls, safety glasses, and closed-toe shoes. Wear disposable lab coats (LLNL Stock Nos. 8405-63672 and -63673) whenever possible.
- Remove protective clothing and equipment, and wash hands before leaving the facility; showering may be required for some operations.

Table B-1. Factor T—Carcinogen types.

Carcinogen types	Points
Proven human carcinogens	10
Suspected human carcinogens	9
Animal carcinogens; human potential	6
Suspected animal carcinogens; possible human potential	5
No data	1
Negative data	0

Table B-2. Factor P—Carcinogenic potency using (a) TD₅₀ and (b) TLV/PEL.**(a)**

Carcinogen potency (TD₅₀)	Points
<100 ng	10
0.1–1 µg	9
1–10 µg	8
10–100 µg	7
0.1–1 mg	6
1–10 mg	5
10–100 mg	4
0.1–1 g	3
1–10 g	2
>10 g	1

(b)

Carcinogen potency (TLV/PEL) (ppm or mg/m³)	Points
0.001	10
0.01	9
0.1	8
1.0	7
10	6
100	5
1000	4
>1000	3

Table B-3. Factor C—Physical characteristics of contaminants.

Physical characteristics	Points
Present in a vapor or a gaseous phase at standard temperature and pressure (STP; temperature = 25°C; pressure = 750 mm Hg)	10
Present as a respirable dust or aerosol at STP*	9
Present as a volatile liquid at STP	7
Present as a volatile solid at STP	6
Present in a mixture with a volatile solvent	5
Nonvolatile liquid at STP	4
Nonvolatile solid at STP (dust)*	3
Nonvolatile solid at STP (granular)	2
Nonvolatile solid at STP (blocks)	1

When considering Factor C, the following shall be contemplated:

- Physical state at room temperature (e.g., solid, liquid, or gas); if solid, is particle size respirable?
- Vapor pressure (V.P. at 20°C in mm Hg) —is airborne concentration approaching action level or PEL?
- Evaporation rate (ether = 1).
- % Volatile by volume %.
- Melting point (M.P.).
- Boiling point (B.P.).
- Water solubility.
- Lipid solubility—promotes skin absorption.
- Specific gravity; settling rate.
- Other relevant information.

*Assumes a dust is respirable until proven otherwise.

Table B-4. Factor R—Route of exposure.

Route of exposure	Points
Inhalation, ingestion, and skin contact	10
Inhalation and skin contact	8
Inhalation and ingestion	7
Skin contact and ingestion	6
Inhalation only	6
Skin contact only	4
Ingestion only	3

Table B-5. Factor E—Exposure potential.

Exposure potential	Points
High-exposure potential	10
Intermediate-exposure potential	5
Low-exposure potential	1
Very low exposure potential	0.1

The following shall be considered for arriving at Factor E:

- Quantity and physical state of material.
- Frequencies and duration (hrs/week) of exposure.
- Work processes (e.g., heating, grinding, or aerosol generating).
- Presence of promoters of respirable aerosols.
- Training of operator/experimenter.
- Work practices (e.g., wet handling of asbestos).
- Other relevant information.

Table B-6. Safety control level requirements.

Points calculated	Level required
0 to 10²	Low
10² to 10⁴	Medium
>10⁴	High

Table B-7. Safety control level recommendations for use of chemical carcinogens.

Safety control level	Low	Medium	High
1.0 <u>Access</u>			
1.1 General	Post signs in area; close door while working.	Post signs in area; close door while working.	Post signs in area; close door at all times; isolate from building traffic.
1.2 Public	Limit to only those involved.	Limit to only those involved.	Prohibit entry.
1.3 Employees	Limit to only those involved.	Limit only to those involved.	Control; maintain written log.
1.4 Animal	Permit only those in experiment.	Permit only those in experiment.	Permit only those in experiment.
1.5 Maintenance and emergency personnel	Advise of hazards and precautions.	Advise of hazards and precautions.	Advise of hazards, precautions, and entry/exit procedures.
2.0 <u>Facilities</u>			
2.1 Handwash, eyewash, and safety shower	Required.	Required.	Required.
2.2 Change room and shower	Provide access.	Provide access.	Provide access.
2.3 Ventilation, general	Provide at least 15 cfm/person; do not recirculate.	Provide at least 15 cfm/person; negative pressure in work area; do not recirculate.	Provide at least 15 cfm/person; negative pressure in work area; do not recirculate; filter exhaust air.
2.4 House vacuum	Use of filter and trap is optional.	Use filter and trap.	Use filter and trap.
2.5 Work surfaces	Design for easy cleaning and decontamination.	Design for easy cleaning and decontamination.	Design for easy cleaning and decontamination; ensure that all walls, floors, and ceilings are sealed.
2.6 Pest control	Required.	Required.	Required.

Table B-7, Continued.

Safety control level	Low	Medium	High
3.0 <u>Work practices</u>			
3.1 Open bench	Permitted.	Prohibited.	Prohibited.
3.2 Ventilated containment	Recommended.	Use hood or equivalent.	Use glove box or equivalent.
3.3 Work surface and floor cleaning	Use wet method or HEPA vacuum; decontaminate.	Use wet method or HEPA vacuum; decontaminate.	Use wet method or HEPA vacuum; decontaminate.
3.4 Mouth pipetting	Prohibited.	Prohibited.	Prohibited.
3.5 Syringes	Use only if no other substitute is available.	Use only if no other substitute is available.	Use only if no other substitute is available.
3.6 Storage and labeling	Control and keep minimal amount; eliminate excess; label containers and cabinets.	Control and keep minimal amount; eliminate excess; label containers and cabinets.	Control and keep minimal amount; eliminate excess; label containers and cabinets; use secondary containment.
4.0 <u>Personal protective equipment and hygiene</u>			
4.1 Eye protection	Required.	Required.	Required.
4.2 Body protection	Use lab or shop coat; change clothes before leaving.	Use lab or shop coat; change clothes before leaving.	Use disposable garments; change clothes before leaving.
4.3 Food, beverages, or cosmetics	Prohibit use or storage.	Prohibit use or storage.	Prohibit use or storage.
4.4 Handwashing	Wash after each task and before leaving.	Wash after each task and before leaving.	Wash after each task and before leaving; showering may be required.
4.5 Gloves	Recommended.	Recommended.	Recommended.

Table B-7, Continued.

Safety control level	Low	Medium	High
5.0 <u>Waste</u>			
5.1 Retention tanks	Inspect regularly.	Inspect regularly.	Inspect regularly.
5.2 Contaminated garments	Do not launder.	Do not launder.	Do not launder.
5.3 Chemicals and equipment	Prepare a waste plan; segregate and label waste containers.	Prepare a waste plan; segregate and label waste containers.	Prepare a waste plan; segregate and label waste containers.

Appendix C

Hazard Review Form

The hazard review form (Fig. C-1) or its equivalent shall be used to evaluate all work in laboratories involving *select carcinogens* and work in other areas involving *regulated carcinogens*. It may also be used for other carcinogens. When combined with a building's controls for using carcinogens, this form may eliminate the need for OSPs.

NOTE: Instructions for completing the form is on the reverse side. The principal investigator/supervisor, the environmental analyst, and the industrial hygienist for the area ES&H team shall complete the hazard review form together. The program manager (or equivalent), the environmental analyst, and the industrial hygienist shall approve it. Each party shall retain a copy on file. The facility manager shall review the completed form for informational purposes (he/she may not necessarily be an approver).

HAZARD REVIEW

INFORMATION—SECTION I	Date: _____	Start Date: _____
Bldg.: _____ Rm.: _____	OSP/FSP #: _____	ES&H Team: _____
Prepared by: _____	Phone: _____	
Principal Investigator/Supervisor: _____	Phone: _____	
Other Personnel Involved: _____		
Chemical Name: _____	CAS #: _____	By-Products: _____
Highest Concentration: _____	Total Quantity: _____	

PROCESS DESCRIPTION—SECTION II	Describe methods: _____

Duration/Frequency: _____	
Route of Exposure: Contact by: _____	Eye _____ Skin _____
_____ Inhalation _____	Ingestion _____ Other _____

HAZARD INFORMATION—SECTION III	MSDS on file? ____ Yes ____ No ____ Unavailable
Type of Carcinogen: ____ Human ____ Animal ____ Potential	
Emergency Response Procedures	
Fire Response: _____	
Spill Response: _____	
Decontamination: _____	
Accidental Injury/Exposure—CONTACT MEDICAL AND DO THE FOLLOWING:	

HAZARD CONTROL REQUIREMENTS—SECTION IV	(To be completed by ES&H team industrial hygienist)
TWA _____ STEL _____ CEILING _____	Standard _____
Safety Control Level _____ (see Supplement 21.16 of the LLNL <i>Health & Safety Manual</i>)	
Monitoring _____ Yes _____ No	Ventilation _____ Yes _____ No
Medical Surveillance _____ Yes _____ No	Regulated/Designated Area _____ Yes _____ No
Recordkeeping _____ Yes _____ No	Personal Protective Equipment _____ Yes _____ No
Signs _____ Yes _____ No	OSP _____ Yes _____ No
Training _____ Yes _____ No	

ENVIRONMENTAL REQUIREMENTS—SECTION V	(To be completed by the ES&H environmental analyst.)
Permit required? _____ Yes _____ No	Comments:
Referred to: _____ Date: _____	
(Name)	
NEPA required? _____ Yes _____ No	
Referred to: _____ Date: _____	
(Name)	
Hazardous waste generated? _____ Yes _____ No	
Waste disposition: _____ HWM _____ Other _____	
(describe)	

Distribution: Principal investigator/supervisor, ES&H team FSP file, team environmental analyst, team industrial hygienist, program manager, and facility manager.

Figure C-1. Hazard review form.

REVIEW/APPROVALS—SECTION VI		Approved _____	Rejected _____	Expiration date _____
_____ Program Manager	_____ Date	_____ Industrial Hygienist	_____ Date	
_____ Facility Manager (review)	_____ Date	_____ Environmental Analyst	_____ Date	

INSTRUCTIONS	<i>(Additional room is provided below for Comments)</i>
Section I:	Provide the information requested for each chemical to be used.
Section II:	Describe the experiment/methods thoroughly (i.e., how will the chemical be handled; what types of process/reactions will be occurring; what is the possible route for personal exposure). Examples of process/reactions are condensation, evaporation, sublimation, exothermic, acidification, mechanical/grinding, aerosolizing, explosion, and vaporization.
Section III:	If the MSDS is unavailable, state the manufacturer and pertinent information so one can be obtained. Emergency Response Procedures refers to what initial action you will take to control a problem.
Section IV and V:	This information is provided by your ES&H team. Submit the hazard review to the ES&H team. Safety control levels are described in Supplement 21.16 of the LLNL <i>Health & Safety Manual</i> . Explain selections for Section IV in the comments section below.
Section VI:	Your ES&H team environmental analyst and industrial hygienist ensure compliance with requirements. The signature of the Program Assurance Manager indicates the hazard review is complete and understood. The ES&H team is responsible for distribution. This hazard review is effective for one year, after which it must be resubmitted.

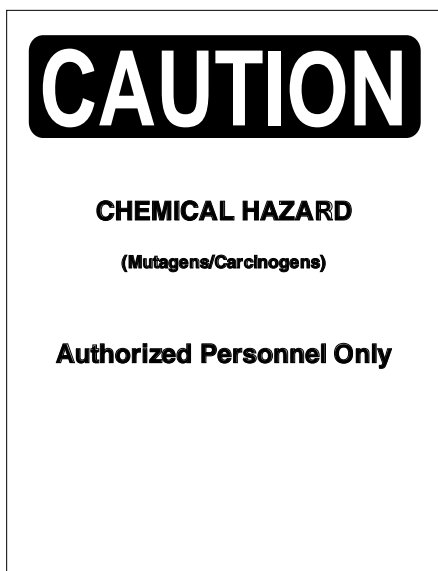
Additional Comments	
----------------------------	--

Figure C-1. Hazard review form (continued).

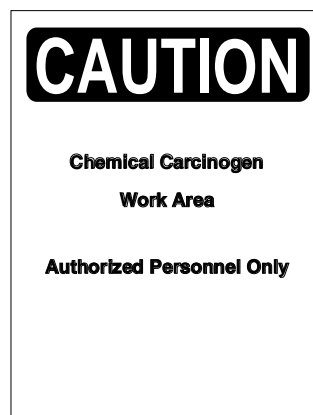
Appendix D

Warning Signs and Danger Labels

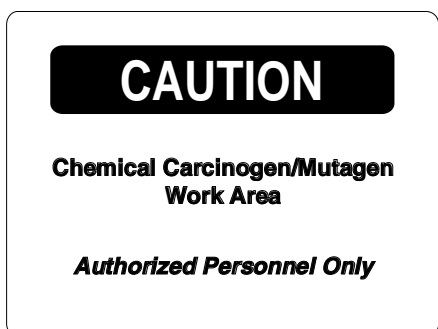
The signs and labels in this appendix are available from Central Supply or the Industrial Hygiene Group of Hazard Control (ext. 2-1214). Custom signs can be made for unique circumstances; however, there are established standards for lettering size, color, and wording. Consult with your area ES&H team industrial hygienist for specific details. Note that these standards are particularly important when developing signs for OSHA carcinogens and established regulated areas.



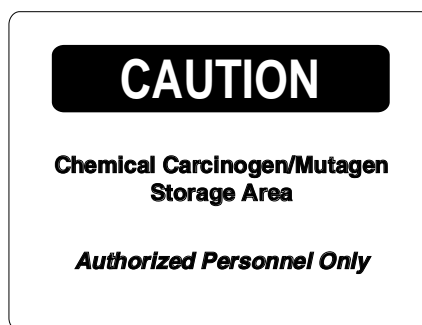
(Industrial Hygiene Group Sign #23;
8 1/2 × 11 in.)



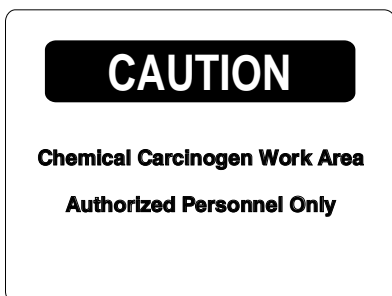
(Industrial Hygiene Group Sign #24
8 1/2 × 11 in.)



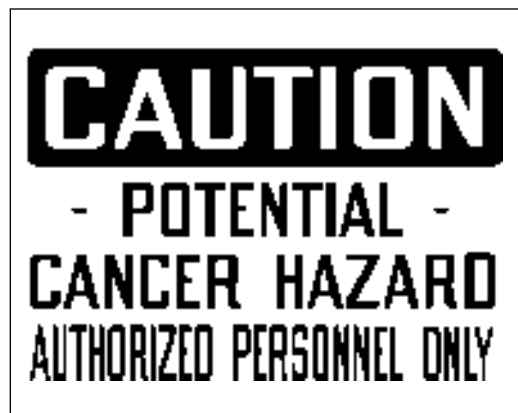
(Industrial Hygiene Group Sign #27;
4 1/2 × 6 1/2 in.)



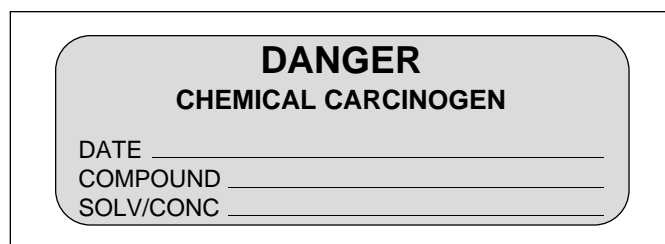
(Industrial Hygiene Group Sign #28;
4 1/2 × 6 1/2 in.)



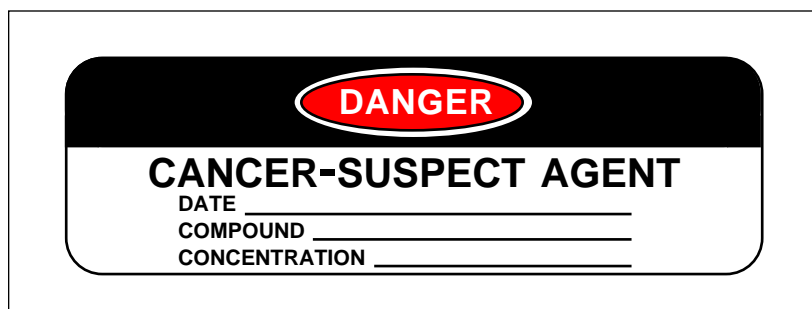
(Industrial Hygiene Group Sign #29;
4 1/2 × 6 1/2 in.)



LLNL Stock No. 4280-57346 (10 × 14 in.)



LLNL Stock No. 4280-64462 (1 × 3 in.)



LLNL Stock No. 4280-67347 (1 × 3 in.)



HAZARDS WARNING

<u>CHEMICAL</u>	<u>BIOHAZARD</u>	<u>PHYSICAL</u>
<input type="checkbox"/> Flammables	<input type="checkbox"/> Human Fluids	<input type="checkbox"/> Ionizing Radiation
<input type="checkbox"/> Corrosives (acids, bases)	<input type="checkbox"/> _____	<input type="checkbox"/> RF/MW Radiation
<input type="checkbox"/> Explosives		<input type="checkbox"/> Lasers
<input type="checkbox"/> Reactives (oxidizers, water reactive, light sensitive, peroxide formers, pyrophoric)		<input type="checkbox"/> Strong Magnetic Fields
<input type="checkbox"/> Particularly Hazardous Substances (carcinogens, reproductive toxins, acutely toxic substances)		<input type="checkbox"/> High Voltage
<input type="checkbox"/> Laboratory Use of Chemicals (H&S Manual Supplement 21.01)		<input type="checkbox"/> High Pressure
		<input type="checkbox"/> High Noise
		<input type="checkbox"/> _____

SPECIAL HAZARDS

Additional guidance for hazardous operations in this area is provided in the following safety procedures:

<u>FSP/OSP Number</u>	<u>Location of Controlled Copy</u>	<u>Responsible Individual</u>
---------------------------	--	-----------------------------------

Material Safety Data Sheets (MSDS) for hazardous materials in this area are available in Building _____ Room _____ and through the MSDS Hotline at ext. 3-2122.

Books and information on hazards identification, the safe handling of hazardous materials, the Laboratory's Chemical Hygiene Plan and the Health Hazard Communication Program may be found in Building _____ Room _____.

Additional Information may be obtained from other responsible personnel:

Responsible Person:	Phone:
Program Supervisor:	Phone:
Facility Manager:	Phone:
ES&H Team Leader:	Phone:
Health & Safety Tech:	Phone:
Hazardous Waste Tech:	Phone:

Approved by _____ Date _____